Forage diversity at ILRI

Forage diversity activities at ILRI are part of the Feed and Forages Biosciences program. The main objective is to conserve, study and maximize uses of the biodiversity of forage genetic resources. These activities are part of collaborative work financed through the CGIAR Genebank Platform. They also contribute to the feeds theme of the CGIAR Research Program on Livestock.

Diversity

Poor-quality feed and fluctuating feed supplies with seasonal feed shortages are major constraints to increase livestock productivity in many tropical countries. Understanding and managing forage diversity is essential for the development of new forage resources to alleviate these constraints and to maintain diversity in forage/pasture ecosystems.

The knowledge generated from this work allows scientists to identify genotypes that have potential as livestock feed. It also allows them to conserve essential forage biodiversity for current and future generations as global public goods.

Genebank

ILRI 's genebank holds a securely-conserved diverse collection of forage accessions, and related information. It makes this available as part of a global system of genetic resources conservation and sustainable use.

The genebank in Addis Ababa, Ethiopia conserves about 19,000 accessions from over 1,000 species. This is one of the most diverse collections of forage grasses, legumes and fodder tree species held in any genebank in the world; it includes the world's major collection of African grasses and tropical highland forages.

At the active and base genebank, seeds are stored in laminated aluminum foil packets at 8°C for medium-term storage, research and distribution of seeds and at -20° C for long-term storage. Quality of the collection is ensured through monitoring of germplasm viability and health.

ILRI also manages field genebanks for grasses that rarely produce seeds or whose seeds are short-lived at Zwai and Debre Zeit in Ethiopia. Seeds of ILRI's own collections are duplicated at the Centro Internacional de Agricultura Tropical (CIAT) in Colombia and at the Svalbard Global Seed Vault in Norway.

In 1994, this germplasm held by ILRI was placed in trust under the auspices of the Food and Agriculture Organization of the United Nations (FAO) as part of an international network of ex situ collections. ILRI claims no ownership nor seeks any intellectual property rights over the germplasm and related information. In October 2006, ILRI signed an agreement to include this material under the International Treaty on Plant Genetic Resources for Food and Agriculture.

Research

The major focus of forage research is to characterize the forage resources in terms of their use as livestock feeds. This involves assessing variation in phenotype and nutritional traits, as well as resistance to diseases and pests. Genetic diversity is also studied using molecular techniques. Research also covers disease and drought tolerance studies. Recent work focuses on the identification of Napier grass accessions with tolerance to Napier grass stunt disease and drought. Information generated from this research is used to identify superior accessions or best bets for further agronomic evaluation and utilization as part of sustainable farming systems.

For example, two accessions from the ILRI collection of Napier grass with resistance to smut disease are being used widely in Kenya, and accessions of the fodder tree Sesbania have been widely adopted by farmers in the highlands of sub-Saharan Africa, especially as part of smallholder dairy systems.

Beyond their uses as feeds for livestock, forages have a key role to plan in enhancing natural assets. They do this through positive effects on soil fertility, by increasing ground cover with associated benefits (biodiversity, carbon sequestration) leading to improved system resilience. They are an important land use strategy for marginal lands and steep slopes that are not suitable for crop production.

Sharing knowledge

To promote use and adoption of forages, ILRI has posted information about the accessions held in the genebank on the internet and, in collaboration with the Commonwealth Scientific and Industrial Research Organization (CSIRO) and CIAT, has developed an interactive information and selection tool for tropical forages. ILRI has also produced information sheets on some key forage species for translation into local languages.

The team at ILRI has been involved in the development of a knowledge sharing platform for genebanks (Crop Genebank Knowledge Base), a forage registry of available forage accessions in the world's forage genebanks and development of a web site to share information on Napier grass stunt and smut diseases.

http://192.156.137.110/forage/frgdsearch.asp
www.tropicalforages.info
http://cropgenebank.sgrp.cgiar.org/
http://sites.google.com/site/napiergrassdiseaseresistance/home

Distribution and training

Every year, ILRI freely distributes about 3,000 samples of germplasm globally for evaluation and further development and use by smallholder farmers. ILRI also maintains the Herbage Seed Unit which focuses on providing a source of tropical forage seeds and planting material of selected best-bet species at cost for use in establishing national forage seed production, including 33 species of herbaceous legumes, 10 species of grass and 5 species of fodder trees.

ILRI has laboratories in Ethiopia to support its research in seed processing, germination, taxonomy, cytology, disease diagnostics, nutrition and molecular studies. These facilities are available on a cost recovery basis to other projects, partners and ILRI graduate and technical associates.

The genebank also provides group training for national programme scientists in germplasm management and seed production and individual training for associates and interns. Training manuals for forage seed production and seed handling in genebanks have been developed to support these activities.

Reports can be downloaded from
http://cgspace.cgiar.org/handle/10568/228

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